

**MENU****SEARCH****INDEX****DETAIL**

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(21)Application number: **11164503**(71)Applicant: **MATSUSHITA ELECTRIC IND  
CO LTD**(22)Date of filing: **10.06.1999**(72)Inventor: **INABA RITSUO**

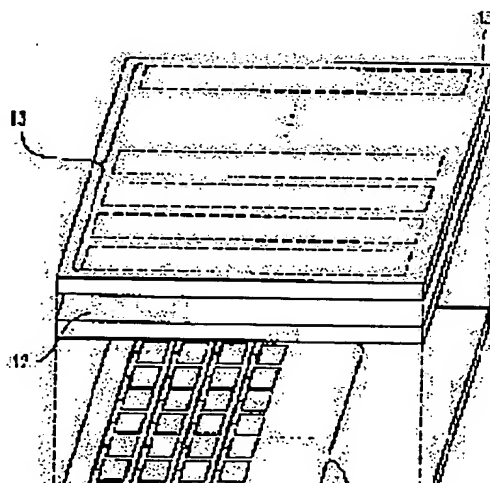
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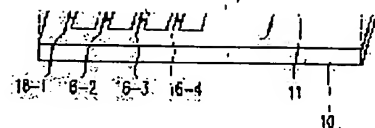
Priority number: **10161837** Priority date: **10.06.1999** Priority country: **JP****10183753****30.06.1999****JP****10207426****23.07.1999****JP**(54) **DISPLAY DEVICE**

(57)Abstract:

**PROBLEM TO BE SOLVED:** To provide a display device for achieving a picture plane with a large area or high definition.

**SOLUTION:** This display device 1 is provided with a 1st substrate 10, a 2nd substrate 15 opposed to the 1st substrate 10, and a function material layer 12 arranged between the 1st substrate 10 and the 2nd substrate 15. Plural signal electrodes 11 connected with a common signal line are formed on the 1st substrate 10. Scanning electrodes 13 are formed on the 2nd substrate 15 so as to be opposed to the plural signal electrodes 11.





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## DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is drawing showing the structure of the display device 1 of the operation gestalt 1 of this invention.

[Drawing 2] It is the plan of the 1st substrate 10 shown in drawing 1 .

[Drawing 3] It is the plan of the 2nd substrate 15 shown in drawing 1 .

[Drawing 4] It is drawing showing the arrangement by which the signal line prepared on the 1st substrate 10 was improved.

[Drawing 5] It is the plan showing arrangement of two or more signal electrodes 11 formed on the 1st substrate 10.

[Drawing 6] It is drawing showing the structure of display-device 1a of the operation gestalt 1 of this invention.

[Drawing 7] It is drawing showing the structure of the display device 2 of the operation gestalt 2 of this invention.

[Drawing 8] It is drawing showing the cross section of the display device 2 which met the A-B line shown in drawing 7 .

[Drawing 9] It is drawing showing the structure of the rear face of the substrate 211 shown in drawing 7 .

[Drawing 10] It is drawing showing the example of the multilayer structure of a substrate 211.

[Drawing 11] It is drawing showing the example in which the active matrix element was formed at the rear face of a substrate 211.

[Drawing 12] It is drawing showing the circuit arrangement of a circuit element shown in drawing 11 .

[Description of Notations]

1, 1a, 2 Display device

10 1st Substrate

11 Signal Electrode

12 Functional-Material Layer

13 Scanning Electrode

15 2nd Substrate

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**CLAIMS**


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**[Claim(s)]**

[Claim 1] The display device which it has the functional-material layer prepared between the 1st substrate, the 2nd substrate which counters the 1st above-mentioned substrate, and the 1st above-mentioned substrate and the 2nd above-mentioned substrate, and two or more signal electrodes driven by the common signal level are formed on the 1st above-mentioned substrate, and is formed on the 2nd above-mentioned substrate so that a scanning electrode may counter two or more above-mentioned signal electrodes.

[Claim 2] It is the display device according to claim 1 whose above-mentioned signal electrode the 1st above-mentioned substrate is a transparent substrate, and is a transparent electrode.

[Claim 3] It is the display device according to claim 1 whose above-mentioned scanning electrode the 2nd above-mentioned substrate is a transparent substrate, and is a transparent electrode.

[Claim 4] It has the functional-material layer prepared between the 1st substrate, the 2nd substrate which counters the 1st above-mentioned substrate, and the 1st above-mentioned substrate and the 2nd above-mentioned substrate. Two or more signal-electrode groups are formed on the 1st above-mentioned substrate, and each of two or more above-mentioned signal-electrode groups contains two or more signal electrodes arranged in the 1st predetermined orientation. It is formed on the 2nd above-mentioned substrate so that two or more scanning electrode groups may counter two or more above-mentioned signal-electrode groups. While a scanning voltage is impressed to two or more scanning electrodes chosen from two or more above-mentioned scanning electrode groups including two or more scanning electrodes prolonged in the 2nd predetermined orientation, each of two or more above-mentioned scanning electrode groups. The display device by which a signal level is impressed to two or more above-mentioned signal electrodes contained in one of two or more above-mentioned signal-electrode groups.

[Claim 5] It is the display device according to claim 4 whose above-mentioned signal electrode the 1st above-mentioned substrate is a transparent substrate, and is a transparent electrode.

[Claim 6] It is the display device according to claim 4 whose above-mentioned scanning electrode the 2nd above-mentioned substrate is a transparent substrate, and is a transparent electrode.

[Claim 7] The above-mentioned display device is a display device according to claim 4 further connected to two or more above-mentioned signal electrodes by which one of two or more above-mentioned signal lines is contained in one of two or more above-mentioned signal-electrode groups including two or more signal lines formed on the 1st above-mentioned substrate.

[Claim 8] Two or more above-mentioned signal lines are display devices according to claim 7 prepared between adjoining signal electrodes.

[Claim 9] It is the display device according to claim 7 from which a pad is formed in the position on the 1st above-mentioned substrate corresponding to the opening between the scanning electrodes which adjoin among two or more above-mentioned scanning electrodes, and one of two or more above-mentioned signal lines is taken out through the above-mentioned pad.

[Claim 10] Field resistance of the above-mentioned signal electrode is a display device given in either of a claim 1 to the claims 9 which are 10 kilo ohms / square centimeter from 100 ohms/square centimeter.

[Claim 11] The above-mentioned signal electrode is a display device given in either of a claim 1 to the claims 10 which consist of the tin oxide, the simple substance materials of a zinc oxide, or

these charges of an admixture.

[Claim 12] The above-mentioned signal line is a display device given in either of a claim 7 to the claims 11 which consist of a binary alloy material containing aluminum or copper.

[Claim 13] The display device which is equipped with the functional-material layer formed on the substrate which has multilayer structure, two or more 1st electrode formed on the above-mentioned substrate, and two or more 1st above-mentioned electrode, and two or more 2nd transparent electrode formed on the above-mentioned functional-material layer, and is electrically connected to the wiring formed in the above-mentioned substrate of the 1st above-mentioned electrode and the 2nd above-mentioned electrode which has the above-mentioned multilayer structure, respectively.

[Claim 14] The substrate which has the 1st page and the 2nd page which counters the 1st above-mentioned page, and two or more 1st electrode formed on the 1st above-mentioned page of the above-mentioned substrate, It has the functional-material layer formed on two or more 1st above-mentioned electrode, and two or more 2nd transparent electrode formed on the above-mentioned functional-material layer. The display device to which each of voltages impressed to two or more 1st above-mentioned electrode and voltages impressed to two or more 2nd above-mentioned electrode is supplied from the above-mentioned 2nd page of the above-mentioned substrate.

[Claim 15] The display device according to claim 14 by which a means to drive two or more 1st above-mentioned electrode and two or more 2nd above-mentioned electrode is prepared in the above-mentioned 2nd page of the above-mentioned substrate.

[Claim 16] The above-mentioned functional-material layer is a display device according to claim 14 which is a liquid crystal layer.

[Claim 17] The above-mentioned functional-material layer is a display device according to claim 14 which is an organic electroluminescence photogenesis layer.

[Claim 18] The above-mentioned functional-material layer is a display device according to claim 14 which is an inorganic electroluminescence photogenesis layer.

[Claim 19] The above-mentioned substrate is a display device according to claim 14 which consists of a material which has flexibility.

[Claim 20] The display device according to claim 14 whose thickness of the above-mentioned display device from [ above-mentioned / of the above-mentioned substrate ] the 2nd page to the 2nd above-mentioned electrode is 150 microns from 50 microns.

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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] Especially this invention relates to the display device suitable for realizing large area or a high definition screen about a display device.

[0002]

[Description of the Prior Art] The point scanning and the line scanning are known as the technique of scanning a flat-surface type display.

[0003] A point scanning is the technique of scanning a flat surface at a point. For example, the whole flat surface can be made to emit light by scanning the point emitting light like the Braun tube using the afterglow. A line scanning is the technique of scanning a flat surface for every line. For example, after making two or more light emitting devices arranged by a certain train emit light, the whole flat surface can be made to emit light by repeating the operation of making two or more light emitting devices arranged by the following train emit light one by one.

[0004]

[Problem(s) to be Solved by the Invention] In order to realize large area or a high definition screen, the photogenesis area needed to be made large or the density of a photogenesis line needed to be made to increase. For that purpose, the energy of the photogenesis section needed to be made to increase by any [ of a point scanning or a line scanning ] case. However, making the energy of the photogenesis section increase causes the various problems of occurrence of heat, a leakage of a signal, the increase in a voltage, the saturation of photogenesis, etc.

[0005] Moreover, in order to realize large area or a high definition screen, the number of the scanning lines needed to be made to increase by any [ of a point scanning or a line scanning ] case. However, making the number of the scanning lines increase causes the problem that the speed of response of a display becomes slow.

[0006] Conventionally, the display device which has simple matrix structure, and the display device which has active matrix structure are known. With the present technique, realizing large area or a high definition screen using the display device of simple matrix structure is supposed that there is a limitation from the following grounds.

[0007]

1. As a display device which realizes large area or a high definition screen, the display device of active matrix structure is in use because of cross talk \*\* between the marginal 3. photogenesis brightness 4. luminous efficiency 5. pixels of the marginal 2. photogenesis size of the photogenesis area of a display device, and an element density.

[0008] However, since the display device of active matrix structure needs elements, such as a switching element and a sample hold element, for every pixel, it has the problem that structure is complicated and a cost increases compared with the display device of simple matrix structure.

[0009] This invention aims at offering the display device which realizes large area or a high definition screen. Especially, this invention aims at offering the display device which realizes large area or a high definition screen by the low cost using simple matrix structure.

[0010]

[Means for Solving the Problem] The 2nd substrate to which the display device of this invention counters the 1st substrate and the 1st above-mentioned substrate, It has the functional-material

layer prepared between the 1st above-mentioned substrate and the 2nd above-mentioned substrate. Two or more signal electrodes driven by the common signal level are formed on the 1st above-mentioned substrate, it is formed on the 2nd above-mentioned substrate so that a scanning electrode may counter two or more above-mentioned signal electrodes, and thereby, the above-mentioned purpose is attained.

[0011] The 1st above-mentioned substrate may be a transparent substrate, and the above-mentioned signal electrode may be a transparent electrode.

[0012] The 2nd above-mentioned substrate may be a transparent substrate, and the above-mentioned scanning electrode may be a transparent electrode.

[0013] The 2nd substrate to which other display devices of this invention counter the 1st substrate and the 1st above-mentioned substrate, It has the functional-material layer prepared between the 1st above-mentioned substrate and the 2nd above-mentioned substrate. Two or more signal-electrode groups are formed on the 1st above-mentioned substrate, and each of two or more above-mentioned signal-electrode groups contains two or more signal electrodes arranged in the 1st predetermined orientation. It is formed on the 2nd above-mentioned substrate so that two or more scanning electrode groups may counter two or more above-mentioned signal-electrode groups. While a scanning voltage is impressed to two or more scanning electrodes chosen from two or more above-mentioned scanning electrode groups including two or more scanning electrodes prolonged in the 2nd predetermined orientation, each of two or more above-mentioned scanning electrode groups A signal level is impressed to two or more above-mentioned signal electrodes contained in one of two or more above-mentioned signal-electrode groups. Thereby, the above-mentioned purpose is attained.

[0014] The 1st above-mentioned substrate may be a transparent substrate, and the above-mentioned signal electrode may be a transparent electrode.

[0015] The 2nd above-mentioned substrate may be a transparent substrate, and the above-mentioned scanning electrode may be a transparent electrode.

[0016] One of two or more above-mentioned signal lines may be connected to two or more above-mentioned signal electrodes contained in one of two or more above-mentioned signal-electrode groups, including further two or more signal lines by which the above-mentioned display device was formed on the 1st above-mentioned substrate.

[0017] Two or more above-mentioned signal lines may be prepared between adjoining signal electrodes.

[0018] A pad may be formed in the position on the 1st above-mentioned substrate corresponding to the opening between the scanning electrodes which adjoin among two or more above-mentioned scanning electrodes, and one of two or more above-mentioned signal lines may be taken out through the above-mentioned pad.

[0019] Field resistance of the above-mentioned signal electrode may be 10 kilo ohms / square centimeter from 100 ohms/square centimeter.

[0020] The above-mentioned signal electrode may consist of the tin oxide, the simple substance materials of a zinc oxide, or these charges of an admixture.

[0021] The above-mentioned signal line may consist of a binary alloy material containing aluminum or copper.

[0022] The substrate in which other display devices of this invention have multilayer structure, and two or more 1st electrode formed on the above-mentioned substrate, It has the functional-material layer formed on two or more 1st above-mentioned electrode, and two or more 2nd transparent electrode formed on the above-mentioned functional-material layer, and connects with the wiring formed in the above-mentioned substrate of the 1st above-mentioned electrode and the 2nd above-mentioned electrode which has the above-mentioned multilayer structure, respectively electrically. Thereby, the above-mentioned purpose is attained.

[0023] The substrate in which other display devices of this invention have the 1st page and the 2nd page which counters the 1st above-mentioned page, The functional-material layer formed on two or more 1st electrode formed on the 1st above-mentioned page of the above-mentioned substrate, and two or more 1st above-mentioned electrode, It has two or more 2nd transparent



electrode formed on the above-mentioned functional-material layer, and each of voltages impressed to two or more 1st above-mentioned electrode and voltages impressed to two or more 2nd above-mentioned electrode is supplied from the above-mentioned 2nd page of the above-mentioned substrate. Thereby, the above-mentioned purpose is attained.

[0024] A means to drive two or more 1st above-mentioned electrode and two or more 2nd above-mentioned electrode may be prepared in the above-mentioned 2nd page of the above-mentioned substrate.

[0025] The above-mentioned functional-material layer may be a liquid crystal layer.

[0026] The above-mentioned functional-material layer may be an organic electroluminescence photogenesis layer.

[0027] The above-mentioned functional-material layer may be an inorganic electroluminescence photogenesis layer.

[0028] The above-mentioned substrate may consist of a material which has flexibility.

[0029] The thickness of the above-mentioned display device from [ above-mentioned / of the above-mentioned substrate ] the 2nd page to the 2nd above-mentioned electrode may be 150 microns from 50 microns.

[0030]

[Embodiments of the Invention] Hereafter, the gestalt of implementation of this invention is explained, referring to a drawing.

[0031] (Operation gestalt 1) View 1 shows the structure of the display device 1 of the operation gestalt 1 of this invention.

[0032] A display device 1 contains the functional-material layer 12 prepared between the 1st substrate 10, the 2nd substrate 15 which counters the 1st substrate 10, and the 1st substrate 10 and the 2nd substrate 15. The display device 1 has simple matrix structure.

[0033] Two or more signal electrodes 11 are formed on the 1st substrate 10. It is formed on the 2nd substrate 15 so that two or more scanning electrodes 13 may counter two or more signal electrodes 11. A signal level is impressed to a signal electrode 11. A scanning voltage is impressed to the scanning electrode 13. The pixel area of the functional-material layer 12 in the position corresponding to the scanning electrode 13 to which the signal electrode 11 to which the signal level is impressed, and the scanning voltage are impressed drives.

[0034] The 1st substrate 10 is a transparent substrate, and each of two or more signal electrodes 11 may be a transparent electrode. In this case, the output light from a display device 1 is outputted from the 1st transparent substrate 10 through the transparent signal electrode 11. Or the 2nd substrate 15 may be a transparent substrate, and each of two or more scanning electrodes 13 may be a transparent electrode. In this case, the output light from a display device 1 is outputted from the 2nd transparent substrate 15 through the transparent scanning electrode 13.

[0035] A transparent substrate is a glass substrate or a plastic plate. The opposite substrate which counters a transparent substrate consists of an electrode hold material.

[0036] Two or more signal electrodes 11 are electrically connected to the signal line 16-1 formed on the 1st substrate 10. Similarly, two or more signal electrodes 11 are electrically connected to a signal line 16-2, 16-3, 16-4, and ... Each of a signal line 16-1, 16-2, 16-3, 16-4, and ... is used in order to impress a signal level to two or more signal electrodes 11.

[0037] The functional-material layer 12 may be constituted by various materials. By changing the material of the functional-material layer 12, this invention is applicable to a display device arbitrary type. For example, what is necessary is just to use a liquid crystal layer as a functional-material layer 12, in applying this invention to a liquid crystal display device. What is necessary is just to use an organic electroluminescence photogenesis layer as a functional-material layer 12, in applying this invention to an organic photogenesis device. What is necessary is just to use an inorganic electroluminescence photogenesis layer as a functional-material layer 12, in applying this invention to an inorganic photogenesis device.

[0038] In addition, although the configuration of a deflection VCF, a light filter, etc. is still required when a display device 1 is a liquid crystal display device, these configurations are omitted in drawing 1.

[0039] Drawing 2 is a plan of the 1st substrate 10. On the 1st substrate 10, two or more signal electrodes 11 are arranged. Each of two or more signal electrodes 11 has the size corresponding to a pixel. For example, the size of a signal electrode 11 may be in agreement with the size of a pixel, and may be larger than the size of a pixel. The size of a pixel is for example, a 100 micron angle. Moreover, each of two or more signal electrodes 11 is arranged in the position corresponding to a pixel.

[0040] It \*\*\*\*s two or more signal electrodes 11 currently formed on the 1st substrate 10 in two or more signal-electrode groups. In the example shown in drawing 2, it \*\*\*\*s two or more signal electrodes 11 in three signal-electrode groups 11a, 11b, and 11c. However, the number of signal-electrode groups is not limited to 3. It may \*\*\*\* two or more signal electrodes 11 in arbitrary numbers of signal-electrode groups.

[0041] Two or more signal electrodes 11-11 (for example, 64 signal electrodes 11-11) by which signal-electrode group 11a was arranged in the orientation of X, Two or more signal electrodes 11-12 (for example, 64 signal electrodes 11-12) arranged in the orientation of X, Two or more signal electrodes 11-13 (for example, 64 signal electrodes 11-13) arranged in the orientation of X and two or more signal electrodes 11-14 (for example, 64 signal electrodes 11-14) arranged in the orientation of X are included. Two or more signal electrodes 11-11 to 11-14 adjoin in the orientation of Y, and are arranged.

[0042] In addition, the orientation of X is the orientation of arrow head X shown in drawing 2. The orientation of Y is the orientation of arrow head Y which is shown in drawing 2 and shines. Typically, although the orientation of X and the orientation of Y intersect perpendicularly, they do not necessarily need to intersect perpendicularly.

[0043] The configuration of signal-electrode group 11b and signal-electrode group 11c is the same as the configuration of signal-electrode group 11a.

[0044] In addition, in drawing 2, since it is easy, only the signal electrode for four trains is shown in each signal-electrode group, and the signal electrode of 5 train henceforth is omitted. In each signal-electrode group, the number of the signal electrodes arranged in the orientation of Y may be arbitrary numbers.

[0045] A signal line 16-1 contains three signal lines 16-11 to 16-31. The signal line 16-11 to 16-31 is adjoined and formed in two or more signal electrodes 11-11 to 11-31. The signal line 16-11 is electrically connected to two or more signal electrodes 11-11 contained in signal-electrode group 11a. The signal line 16-21 is electrically connected to two or more signal electrodes 11-21 contained in signal-electrode group 11b. The signal line 16-31 is electrically connected to two or more signal electrodes 11-31 contained in signal-electrode group 11c.

[0046] The signal line 16-12 to 16-32 is formed between two or more signal electrodes 11-11 to 11-31, and two or more signal electrodes 11-12 to 11-32. Similarly, it is prepared between the signal electrodes by which the signal line 16-13 to 16-33 and the signal line 16-14 to 16-34 also adjoined in the orientation of Y.

[0047] Drawing 3 is a plan of the 2nd substrate 15. On the 2nd substrate 15, two or more scanning electrodes 13 are arranged. In addition, since the scanning electrode 13 is formed in the background of the space of drawing 3, the scanning electrode 13 is shown by the dashed line in drawing 3.

[0048] It \*\*\*\*s two or more scanning electrodes 13 currently formed on the 2nd substrate 15 in two or more scanning electrode groups. In the example shown in drawing 3, it \*\*\*\*s two or more scanning electrodes 13 in three scanning electrode groups 13a, 13b, and 13c so that it may correspond to three signal-electrode groups 11a, 11b, and 11c, respectively. However, the number of scanning electrode groups is not limited to 3. Corresponding to the number of signal-electrode groups, it may \*\*\*\* two or more scanning electrodes 13 in arbitrary numbers of scanning electrode groups.

[0049] Scanning electrode group 13a contains two or more scanning electrodes 13 (for example, 64 scanning electrodes 13) arranged in the orientation of X. Each of two or more scanning electrodes 13 is prolonged in the orientation of Y.

[0050] The configuration of scanning electrode group 13b and scanning electrode group 13c is the

same as the configuration of scanning electrode group 13a.

[0051] In addition, since it is easy, drawing 3 shows only three scanning electrodes 13-11 to 13-13 among two or more scanning electrodes 13 contained in scanning electrode group 13a. Only three scanning electrodes 13-21 to 13-23 are shown among two or more scanning electrodes 13 contained in scanning electrode group 13b, and only three scanning electrodes 13-31 to 13-33 are shown among two or more scanning electrodes 13 contained in scanning electrode group 13c.

[0052] Hereafter, an operation of a display device 1 is explained with reference to the drawing 2 and the drawing 3.

[0053] In the 1st scanning interval, a scanning voltage is impressed to the scanning electrode 13-11 contained in scanning electrode group 13a, the scanning electrode 13-21 contained in scanning electrode group 13b, and the scanning electrode 13-31 contained in scanning electrode group 13c.

[0054] Next, in the 2nd scanning interval, a scanning voltage is impressed to the scanning electrode 13-12 contained in scanning electrode group 13a, the scanning electrode 13-22 contained in scanning electrode group 13b, and the scanning electrode 13-32 contained in scanning electrode group 13c.

[0055] next, the 3rd scanning-interval \*\*\*\* -- a scanning voltage is impressed to the scanning electrode 13-13 contained in scanning electrode group 13a, the scanning electrode 13-23 contained in scanning electrode group 13b, and the scanning electrode 13-33 contained in scanning electrode group 13c

[0056] Thus, in each scanning interval, a scanning electrode drives so that a scanning voltage may be simultaneously impressed to two or more scanning electrodes chosen from two or more scanning electrode groups one [ at a time ], respectively. Such a drive is controlled by the scanning electrode drive circuit (not shown).

[0057] A signal level is impressed to two or more signal electrodes 11-11 contained in signal-electrode group 11a, 11-12, 11-13, and 11-14 through a signal line 16-11, 16-12, 16-13, and 16-14, respectively. A signal level is impressed to two or more signal electrodes 11-21 contained in signal-electrode group 11b, 11-22, 11-23, and 11-24 through a signal line 16-21, 16-22, 16-23, and 16-24, respectively. A signal level is impressed to two or more signal electrodes 11-31 contained in signal-electrode group 11c, 11-32, 11-33, and 11-34 through a signal line 16-31, 16-32, 16-33, and 16-34, respectively.

[0058] The value of a signal level is updated synchronizing with change of a scanning interval. The impression to the signal electrode of a signal level is controlled by the signal-electrode drive circuit (not shown).

[0059] The pixel area of the functional-material layer 12 pinched by the signal electrode to which the scanning electrode to which a scanning voltage is impressed, and a signal level are impressed drives. Therefore, in each scanning interval, three pixel areas drive simultaneously. For example, when the functional-material layer 12 is an organic electroluminescence photogenesis layer, in each scanning interval, three pixel areas will emit light simultaneously.

[0060] For example, the pixel area of the functional-material layer 12 pinched by the scanning electrode 13-11, the signal electrode 11-11, 11-12, 11-13, 11-14, and ... in the 1st scanning interval, The scanning electrode 13-21, the signal electrode 11-21, 11-22, 11-23, 11-24, and the pixel area of the functional-material layer 12 pinched by ..., The pixel area of the functional-material layer 12 pinched by the scanning electrode 13-31, the signal electrode 11-31, 11-32, 11-33, 11-34, and ... emits light.

[0061] Thus, it is enabled to realize large area or a high definition screen by driving two or more pixel areas simultaneously using the display device of simple matrix structure.

[0062] In addition, it is not necessary to necessarily arrange the signal line for supplying a signal level to a signal electrode 11 between the adjoining signal electrodes 11.

[0063] Drawing 4 shows the arrangement by which the signal line prepared on the 1st substrate 10 was improved. It takes out in the position on the 1st substrate 10 corresponding to the opening between the adjoining scanning electrodes 13, and the pad 31 is formed. One signal line is pulled out along the opening between the scanning electrodes 13 which adjoin from each of the ejection pad 31. The signal line pulled out from the ejection pad 31 is connected to the ejection electrode

32. The ejection electrode 32 is formed in the position corresponding to the scanning electrode 13 of the 2nd substrate 15. The ejection electrode 32 of each other may be connected by the technique by mechanical stress, for example.

[0064] What is necessary is just to prepare one signal line between adjoining signal electrodes according to the arrangement shown in drawing 4. Thereby, the complicatedness of two or more signal lines passing along between signal electrodes (or photogenesis pixel) is avoidable.

[0065] In addition, it is also possible to form the scanning electrode 13 on the 1st substrate 10 by some display device. In this case, the ejection pad for scanning electrode 13 is prepared in the 1st substrate 10, and it may be made to supply a scanning voltage to the scanning electrode 13 through the ejection pad.

[0066] In addition, it is not necessary to necessarily \*\*\*\* two or more signal electrodes 11 currently formed on the 1st substrate 10 in two or more signal-electrode groups.

[0067] Drawing 5 is a plan showing arrangement of two or more signal electrodes 11 formed on the 1st substrate 10. Each of two or more signal electrodes 11 has the size corresponding to a pixel. For example, the size of a signal electrode 11 may be in agreement with the size of a pixel, and may be larger than the size of a pixel. The size of a pixel is for example, a 100 micron angle. Moreover, each of two or more signal electrodes 11 is arranged in the position corresponding to a pixel.

[0068] In the example shown in drawing 5, two or more signal electrodes 11-1 are arranged in the orientation of X, and each of two or more signal electrodes 11-1 is connected to the common signal line 16-1. Similarly, two or more signal electrodes 11-2, 11-3, and 11-4 are arranged in the orientation of X, respectively. Each of two or more signal electrodes 11-2 is connected to the common signal line 16-2. Each of two or more signal electrodes 11-3 is connected to the common signal line 16-3. Each of two or more signal electrodes 11-4 is connected to the common signal line 16-4.

[0069] In addition, in drawing 5, since it is easy, only the signal electrode for four trains is shown and the signal electrode of 5 train henceforth is omitted. The number of the signal electrodes arranged in the orientation of Y on the 1st substrate 10 may be arbitrary numbers.

[0070] The 1st substrate 10 by which two or more signal electrodes 11 have been arranged as shown in drawing 5 may be used as the 1st substrate 10 in the display device 1 shown in drawing 1. That is, the 2nd substrate 15 is formed so that the 1st substrate 10 may be countered, and the functional-material layer 12 is formed between the 1st substrate 10 and the 2nd substrate 15.

[0071] Two or more scanning electrodes 13 are formed on the 2nd substrate 15. Each of two or more scanning electrodes 13 is prolonged in the orientation of Y. A scanning voltage is impressed alternatively [ one ] of two or more scanning electrodes 13. A signal level is impressed to each of a signal line 16-1, 16-2, 16-3, 16-4, and ... Consequently, a signal level common to two or more signal electrodes 11 connected common to one signal line is impressed. The pixel area of the functional-material layer 12 in the position corresponding to the scanning electrode 13 to which the signal electrode 11 to which the signal level is impressed, and the scanning voltage are impressed drives.

[0072] As already explained with reference to drawing 1, the 1st substrate 10 is a transparent substrate, and each of two or more signal electrodes 11 may be a transparent electrode. In this case, the output light from a display device 1 is outputted from the 1st transparent substrate 10 through the transparent signal electrode 11. Or the 2nd substrate 15 may be a transparent substrate, and each of two or more scanning electrodes 13 may be a transparent electrode. In this case, the output light from a display device 1 is outputted from the 2nd transparent substrate 15 through the transparent scanning electrode 13.

[0073] In addition, the scanning electrode 13 may have the size corresponding to a pixel like the signal electrode 11. In this case, a scanning voltage common to two or more scanning electrodes 13 by which connected with the one common scanning line and two or more scanning electrodes 13 were connected to the common scanning line is impressed.

[0074] Drawing 6 shows the structure of display-device 1a of the operation gestalt 1 of this invention. Display-device 1a has the structure suitable for the organic photogenesis device.

[0075] Display-device 1a contains the metal substrate 51 and the insulating layer 52 formed on the metal substrate 51. By removing the fraction corresponding to each pixel from an insulating layer 52, the metal substrate 51 can be used as a cathode electrode. An organic functional-material layer is formed on a cathode electrode, and a transparent electrode is formed on an organic functional-material layer. Output light is taken out from a transparent electrode.

[0076] As a metallic material of the metal substrate 51, aluminum (an aluminum-lithium alloy etc. is included), stainless steel, etc. may be used. An electronic transportation layer and a hole transportation layer are formed as an organic functional-material layer on the metal substrate 51. A transparent electrode is formed on a hole transportation layer. A transparent electrode is produced by technique, such as vacuum evaporation or sputtering.

[0077] Since an organic photogenesis device cannot avoid occurrence of the heat by photogenesis in each part of photogenesis, it must always take the problem of heat into consideration for large area-ization. By introducing a metal substrate, advantages, like that the thermolysis conditions of heat become good, that a light emitting device possible [ making it thin ] and flexible becomes possible, and the permeability of moisture is low are acquired.

[0078] In addition, you may use a metal substrate as a cathode electrode, and may be made to form a cathode electrode on a metal substrate. An insulator layer may be prepared on a metal substrate and a wiring may be formed on the insulator layer.

[0079] The glass substrate which may be used as a transparent substrate may be the soda glass of for example, 0.7mm \*\*. A diffusion prevention layer is formed on the soda glass for diffusion prevention of ion, such as soda, and a transparent electrode is formed on the diffusion prevention layer. A transparent electrode is the oxide of the indium tin of for example, 0.05 micron \*\*.

[0080] A signal line is produced with aluminum. A signal line may be formed so that it may have the line breadth of 2 microns, and the thickness of 1 micron.

[0081] The gap between 2 microns and a signal line can be made into 2 microns for the line breadth of one signal line. In this case, the width of face needed in order are parallel and to prepare three signal lines becomes micron  $(2+2) \times 3 + 2 \text{ micron} = 14 \text{ micron}$ . Thus, even if it is parallel and it prepares three signal lines, the width of face of three signal lines is fully the parvus, and there is no possibility that a photogenesis area may be restricted by those signal lines.

[0082] The width of face of a scanning electrode is wide compared with the width of face of a signal line. Therefore, a scanning electrode may be easily produced compared with a signal line. It is necessary to pass the comparatively big current corresponding to one line to a scanning electrode. A scanning electrode is produced with metals, such as aluminum. The width of face of a scanning electrode is determined corresponding to the size of a pixel. For example, when the size of a pixel is 0.1mm angle, the width of face of a scanning electrode may be 0.1mm.

[0083] When display devices 1 and 1a are organic photogenesis devices, material selection of a scanning electrode is important. In this case, generally the alloy of aluminum and a lithium or the alloy of magnesium and silver is used as a material of a scanning electrode. With the gestalt of this operation, a scanning electrode makes an aluminum-lithium alloy a material and is produced by the resistance heating method using the metal mask.

[0084] In the conventional display device, in order to reduce the voltage loss in the lead-wire section as much as possible, the resistance of a transparent electrode needed to be held down as low as possible. For this reason, parvus resistance was calculated more nearly extraordinarily than the resistance needed by the function of an original pixel fraction. Consequently, in order to lower the resistance of a transparent electrode, the structure of a transparent electrode and the material needed to be determined at the sacrifice of other adverse elements.

[0085] Specifically, the material of a transparent electrode needed to be limited to the oxide compound of indium tin, and the thickness needed to be limited. Such limitation had become the cause of producing the problem of the increase in a power loss, occurrence of a cross talk, and delay of a signal.

[0086] On the other hand, in the display device of this invention, since the size of a transparent electrode can be corresponded to the size of a pixel, it is not necessary to hold down the resistance of a transparent electrode low. according to the display device of this invention, this is because the

current path length which flows a transparent electrode can be markedly boiled compared with the former and can be shortened For example, when the size of a transparent electrode is 0.1mm angle, the current path length which flows a transparent electrode is only 0.1mm [ at most ]. This enables it to enable it to perform material selection of a transparent electrode freely, and to make thin 2 figures of the thicknesss of a transparent electrode.

[0087] The material cost of a transparent electrode can be reduced by making the thickness of a transparent electrode thin. When an indium electrode was especially used as a transparent electrode, it was enabled to make the cost of a transparent electrode or less [ of the whole cost ] into 1/10. This leads to compaction of process time, such as a reduction of a material process cost, and sputtering, the enhancement in a reliability, etc.

[0088] The material of a transparent electrode and the material of a signal line influence the life of a display device. Generally, by passing the electrical and electric equipment into a material, if the material ionizes and a move (the so-called migration) of the matter arises, a maintenance of the property of a display device will be barred. As mentioned above, in this invention, material selection of a transparent electrode can be performed freely. Therefore, the influence of the property degradation by migration can be lost by choosing the material of a transparent electrode, and the material of a signal line pertinently. Thereby, it is enabled to attain longevity life-ization of a display device.

[0089] In addition, when setting the resistance of a transparent electrode as a comparatively high value, it is desirable that field resistance (width of face of 1cm, electric resistance per 1cm of distance) of a transparent electrode is 10 kilo ohms / square centimeter from 100 ohms/square centimeter.

[0090] The transparent electrode may consist of simple substance materials or these charges of an admixture, such as the tin oxide or a zinc oxide.

[0091] The signal line may consist of a binary alloy material containing aluminum or copper. For example, the material of a signal line may be a binary alloy material which mixed other metals (for example, copper, tin, silver, nickel, zinc, etc.) to aluminum. Or the material of a signal line may be a binary alloy material which carried out little mixture of other metals (for example, aluminum, tin, nickel, silver, zinc, etc.) at copper.

[0092] (Operation gestalt 2) View 7 shows the structure of the display device 2 of the operation gestalt 2 of this invention.

[0093] A display device 2 contains a substrate 211, two or more cathode electrodes 212 formed on the substrate 211, the functional-material layer 213 formed on two or more cathode electrodes 212, and two or more transparent anode electrodes 215 formed on the functional-material layer 213. The display device 2 has simple matrix structure.

[0094] Each of voltages impressed to two or more cathode electrodes 212 and voltages impressed to two or more anode electrodes 215 is supplied from the field in which the cathode electrode 212 is formed among the fields of a substrate 211, and the field (henceforth the rear face of a substrate 211) of an opposite side.

[0095] Thus, it becomes unnecessary to arrange the ejection electrode for taking out those voltages to the lateral portion of a display device 2 by supplying the voltage (supply voltage of minus) impressed to the cathode electrode 212, and the voltage (supply voltage of a plus) impressed to the anode electrode 215 from the rear face of a substrate 211. This enables it to carry out tiling of the display device 2 in 2 dimensions.

[0096] For example, it is enabled to constitute the display device which has a 3Nx3M piece pixel by arranging a total of every nine three every direction display devices 2 which have an NxM piece pixel. Thereby, it is enabled to realize a big screen or a high definition screen using the display device of simple matrix structure.

[0097] Moreover, a fall of the rate of opening can be prevented by supplying the voltage (supply voltage of minus) impressed to the cathode electrode 212, and the voltage (supply voltage of a plus) impressed to the anode electrode 215 from the rear face of a substrate 211.

[0098] Furthermore, since the substrate for holding the anode electrode (transparent electrode) 215 becomes unnecessary, thickness of the laminated structure of the display device 2 from the



rear face of a substrate 211 to the anode electrode 215 can be made thin. For example, it is possible to make the thickness into 50 microns - 150 microns.

[0099] In addition, although two or more cathode electrodes 212 and functional-material layers 213 are spatially shown are separated in drawing 7, this is because an explanation is expedient. In fact, two or more cathode electrode layers 212 and functional-material layers 213 are formed so that it may contact mutually. Although the functional-material layer 213 and two or more anode electrodes 215 are similarly shown are separated spatially in drawing 7, this is because an explanation is expedient. In fact, the functional-material layer 213 and two or more anode electrodes 215 are formed so that it may contact mutually.

[0100] Drawing 8 shows the cross section of the display device 2 which met the A-B line shown in drawing 7. Drawing 9 shows the structure of the rear face of the substrate 211 shown in drawing 7.

[0101] The cathode electrode 212 is electrically connected to wiring 219a prepared in the rear face of a substrate 211 through lead-in-wire 218a. Lead-in-wire 218a is formed so that a substrate 211 may be penetrated. Wiring 219a is electrically connected to cathode electrode drive circuit 220a for driving the cathode electrode 212. Cathode electrode drive circuit 220a is prepared in the rear face of a substrate 211. Thereby, the voltage outputted from cathode electrode drive circuit 220a is supplied to the cathode electrode 212 through lead-in-wire 218a from the rear face of a substrate 211.

[0102] The anode electrode 215 is electrically connected to wiring 219b prepared in the rear face of a substrate 211 through lead-in-wire 218b. Lead-in-wire 218b is formed so that the organic-material layer 213 and the substrate 211 may be penetrated. Especially lead-in-wire 218b is formed so that it may pass along between the adjoining cathode electrodes 212 which are formed on the substrate 211. Wiring 219b is electrically connected to anode electrode drive circuit 220b for driving the anode electrode 215. Anode electrode drive circuit 220b is prepared in the rear face of a substrate 211. Thereby, the voltage outputted from anode electrode drive circuit 220b is supplied to the anode electrode 215 through lead-in-wire 218b from the rear face of a substrate 211.

[0103] In addition, you may be made to establish the single drive circuit which drives the cathode electrode 212 and the anode electrode 215 in the rear face of a substrate 211 instead of cathode electrode drive circuit 220a and anode electrode drive circuit 220b. Wiring 219a and wiring 219b are connected to the single drive circuit.

[0104] In addition, you may be made to take out the anode electrode 215 from the rear face of a substrate 211 from the front face of a light emitting device.

[0105] When the voltage is impressed between the cathode electrode 212 and the anode electrode 215, the pixel area of the functional-material layer 213 in the position where the cathode electrode 212 and its anode electrode 215 cross drives. For example, when the functional-material layer 213 is an organic electroluminescence photogenesis layer, the pixel area in the position where the cathode electrode 212 and its anode electrode 215 cross emits light.

[0106] A substrate 211 is produced from the material which composite-sized one of the materials or those materials of a resin, a ceramic, and a metal. The ceramic and the metal are excellent in respect of heat conduction. A ceramic is insulation, and since a metal is conductivity, it needs to perform a substrate design taking advantage of each characteristic feature. On the other hand, when using an organic material as a substrate material, the easy thing of I/O of the ease of a device configuration and an electrode etc. is mentioned to instead of [ with bad heat conduction ] as an advantage.

[0107] When using a metal substrate as a substrate 211, a substrate 211 can be treated like the case where a ceramic-substrate is used as a substrate 211, by preparing an insulating layer in a surface of metal. For example, what is necessary is just to prepare insulating layers, such as oxalic acid aluminum, in the front face of the aluminum, when a substrate 211 is an aluminum substrate.

[0108] As for a substrate 211, it is desirable to have flexibility. For example, the substrate 211 which has flexibility is producible by pasting up a polyimide and \*\*\*\*. Or you may produce the substrate 211 which has flexibility by pasting up a glass epoxy resin and \*\*\*\*. As for the material

manipulation in a pixel pitch with a sufficient precision. From such a viewpoint, various kinds of general-purpose films of polyester and aramid others can be widely used as a material of a substrate 211.

[0109] The cathode electrode 212 consists of for example, AlLi alloy or MgAg alloy, and it is formed so that it may have the thickness of 1500Å. The anode electrode (transparent electrode) 215 consists of ITO, ZnO, or Au. The passivation layer 216 is formed on the anode electrode 215, and the external covering 217 is formed on the passivation layer 216.

[0110] In addition, although the substrate 211 may have the single layer structure, it is desirable to have multilayer structure. It is because a signal line and the scanning line can be separated and formed in the layer from which multilayer structure is different. Each class in multilayer structure consists of a resin, a ceramic, or a metal.

[0111] Drawing 10 shows the example of the multilayer structure of a substrate 211. In the example shown in drawing 10, the interval wiring layers 223a and 223b are formed in the interior of a substrate 211, and the backwiring layers 219a and 219b are formed in the rear face of a substrate 211.

[0112] One or 2 of lines, such as a signal line, the scanning line, an earth wire, and a power line, are formed in the interval wiring layers 223a and 223b. For example, in the interior of a substrate 211, a signal line and the scanning line are separable by forming a signal line in interval wiring layer 223a, and forming the scanning line in interval wiring layer 223b. Other lines which are not formed in the interval wiring layers 223a and 223b may be formed in the backwiring layers 219a and 219b.

[0113] When forming an active matrix element on a substrate 211 especially, it is desirable to make a substrate 211 into multilayer structure. An active matrix element is because an electric power supply line is needed.

[0114] In addition, a substrate 211 cannot be overemphasized by that it may have the multilayer structure of three or more layers. Especially, you may be made to prepare a two or more-layer interval wiring layer in the interior of a substrate 211.

[0115] In addition, when a substrate 211 has multilayer structure, you may be made to form both cathode electrode drive circuit 220a, and anode electrode drive circuit 220b [ one side or ] which are shown in drawing 9 in the multilayer structure of a substrate 211. For example, cathode electrode drive circuit 220a may be electrically connected to the cathode electrode 212 through interval wiring layer 223a prepared in the interior of a substrate 211. Anode electrode drive circuit 220b may be electrically connected to the anode electrode 215 through interval wiring layer 223b prepared in the interior of a substrate 211. When all circuits required in order to drive the cathode electrode 212 and the anode electrode 215 in the multilayer structure of a substrate 211 are formed, it is not necessary to form a backwiring layer in the rear face of a substrate 211.

[0116] In the multilayer structure of a substrate 211, arbitrary elements, such as a memory device for operating the display device 2 other than cathode electrode drive circuit 220a and anode electrode drive circuit 220b, a controlling element, a memory display controller, and a driver, may be prepared.

[0117] The functional-material layer 213 may be constituted by various materials. By changing the material of the functional-material layer 213, this invention is applicable to a display device arbitrary type. For example, what is necessary is just to use a liquid crystal layer as a functional-material layer 213, in applying this invention to a liquid crystal display device. What is necessary is just to use an organic electroluminescence photogenesis layer as a functional-material layer 213, in applying this invention to an organic photogenesis device. In this case, the functional-material layer 213 contains electronic transportation layer 213a and hole transportation layer 213b. What is necessary is just to use an inorganic electroluminescence photogenesis layer as a functional-material layer 213, in applying this invention to an inorganic photogenesis device.

[0118] In addition, although the configuration of a deflection VCF, a light filter, etc. is still required when a display device 2 is a liquid crystal display device, these configurations are omitted in the drawing 7 and the drawing 8.



[0119] Drawing 11 shows the example in which the active matrix element was formed at the rear face of a substrate 211. An active matrix element (for example, MOS transistor) is formed by using technique, such as CVD and sputtering, and forming thin films and gate layers, such as an amorphous silicon or poly-silicon, on a substrate 211.

[0120] In case an active matrix element is formed, the elevated-temperature process is required. Therefore, as for the material of a substrate 211, it is desirable that they are the ceramic which has the thermal resistance of 300 degrees or more, or a metal.

[0121] In order to perform an active matrix drive, it is necessary to continue sending the current according to the time [ to carry out memory in a term and be equivalent to the one period ] signal which is equivalent to one period of the scanning line in the signal supplied to a pixel to the pixel. For that purpose, the memory device which has a memory (namely, function which carries out memory of the signal and supplies the current according to the amount of memory to a pixel), and the controlling element which has an antisuckback function (namely, switching function to prevent that power is supplied only to a specific pixel and power is supplied to other pixels) are needed at least.

[0122] It may be directly formed on a substrate 211 using the process that the memory device and controlling element which have such a function are well-known.

[0123] In drawing 11, 231 shows the gate circuit element of a current and 232 shows the control circuit element of a current. 233 shows the capacitor for deciding a time constant. Furthermore, the power line 234 and the grand line 235 (grounding) for supplying power are formed. In addition, in the gate and 238, the source and 239 show a signal line and 240 shows [ 236 / a drain and 237 ] the scanning line.

[0124] Drawing 12 shows the circuit arrangement of a circuit element shown in drawing 11.

[0125] Thus, shortening of the length of a wiring and miniaturization of a system can be attained by preparing the memory device for operating a display device 2, a controlling element, a memory display controller, a driver, etc. in the photogenesis side of a display device 2, and the field (namely, rear face of a substrate) of an opposite side. Low resistance-ization of a wiring can be attained by shortening the length of a wiring. Furthermore, as mentioned above, it is very effective to prepare a wiring and an element in the rear face of a substrate when realizing large area or a high definition screen.

[0126]

[Effect of the Invention] According to this invention, two or more pixel areas drive simultaneously. Thereby, it is enabled to realize large area or a high definition screen using the display device of simple matrix structure.

[0127] In this invention, in order to use simple matrix structure, as compared with active matrix structure, the process which production of a display device takes is short, and there is an advantage that an elevated-temperature process is unnecessary, in the production process. Thereby, a reduction of a cost can be aimed at.

[0128] Moreover, according to this invention, it is not necessary to hold down the resistance of a transparent electrode low. Thereby, material selection of a transparent electrode can be performed freely. Moreover, thickness of a transparent electrode can be made thin. This reduces a cost and raises a reliability.

[0129] Thus, this invention is a low cost and enables it to offer the display device which realizes large area or a high definition screen. Furthermore, this invention is common basic technique applicable to various displays. Therefore, the composite-effect by this invention is large.

[0130] Moreover, in this invention, since two or more pixel areas are driven simultaneously, the area of the screen which should be scanned can be reduced. Consequently, the speed of response of a display device improves. Moreover, since the area of the screen which should be scanned is reduced, the voltage impressed to a scanning electrode and a signal electrode can be made low. Thereby, it is enabled to suppress occurrence of a cross talk. Consequently, the quality of a display device improves. Moreover, a fall of power consumption, the enhancement in a reliability, and a reduction of the cost of a drive circuit can be aimed at by fall of the voltage impressed to a scanning electrode and a signal electrode.

[0131] Furthermore, according to this invention, the drive circuit which drives the drive circuit which drives a cathode electrode, and an anode electrode is prepared in the multilayer structure of a substrate. Or the voltage impressed to a cathode electrode and the voltage impressed to an anode electrode are supplied from the rear face of a substrate. Thereby, it becomes unnecessary to arrange the ejection electrode for taking out those voltages to the lateral portion of a display device. This enables it to carry out tiling of the display device in 2 dimensions. Consequently, it is enabled to realize a big screen or a high definition screen using the display device of simple matrix structure.

[0132] Moreover, the advantage that a multilayer interconnection is realizable is acquired by supplying those voltages from the rear face of a substrate by making into multilayer structure the substrate which can produce directly the active matrix element which can separate the work of the wiring and the production work of a light emitting device which can enlarge the rate of opening on a substrate.

[0133] Moreover, a thermolysis property is improvable by using a substrate material as ceramics other than glass, and a metal.

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[Translation done.]

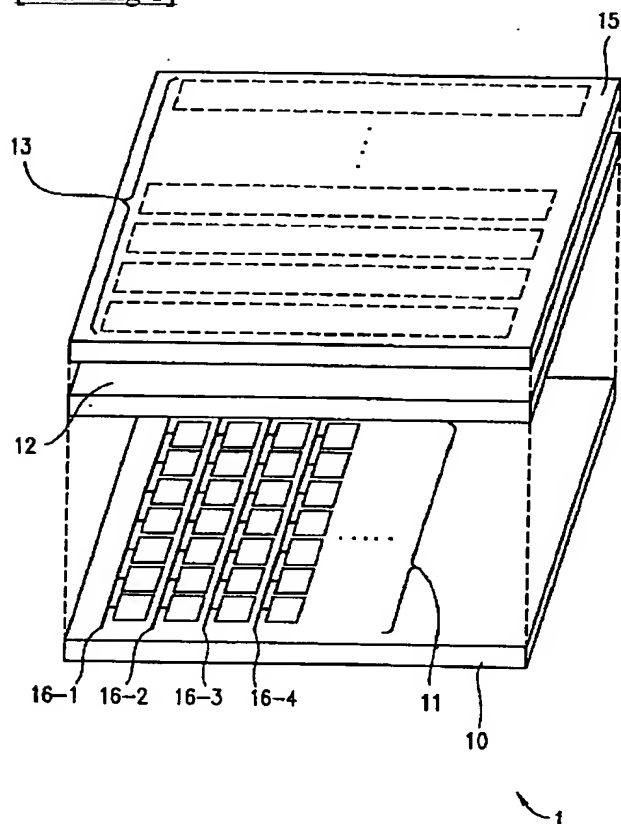
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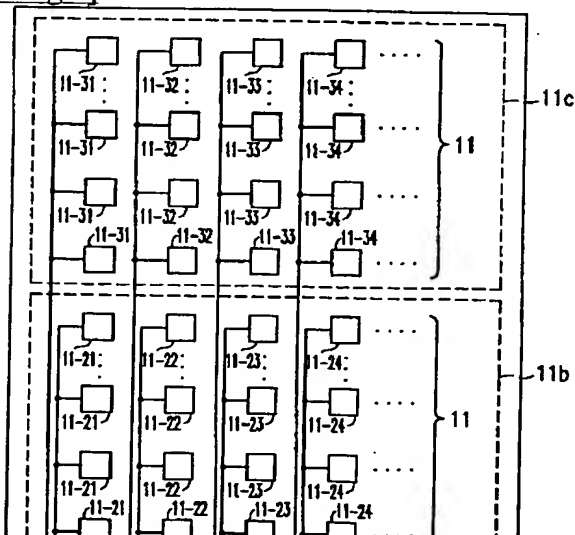
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2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

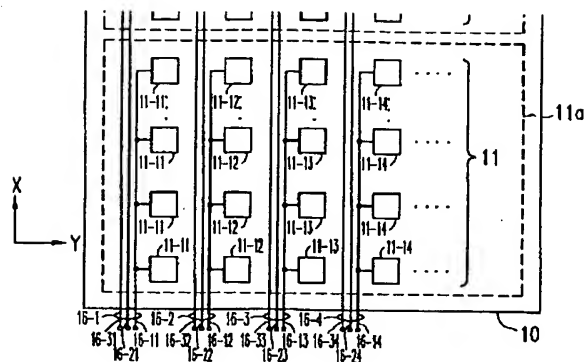
## DRAWINGS

[Drawing 1]

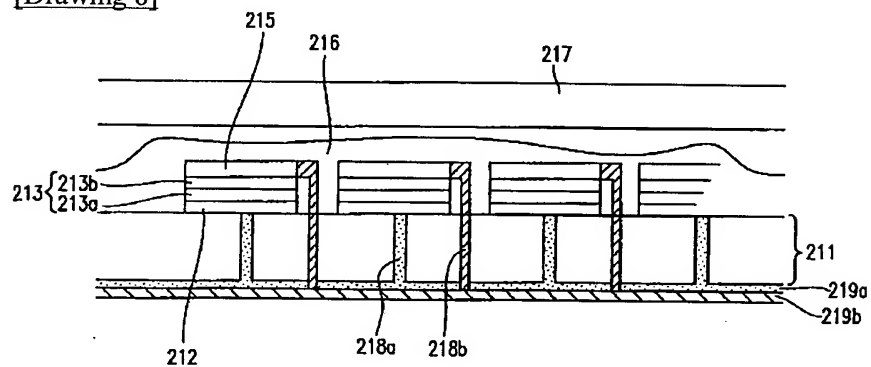


[Drawing 2]

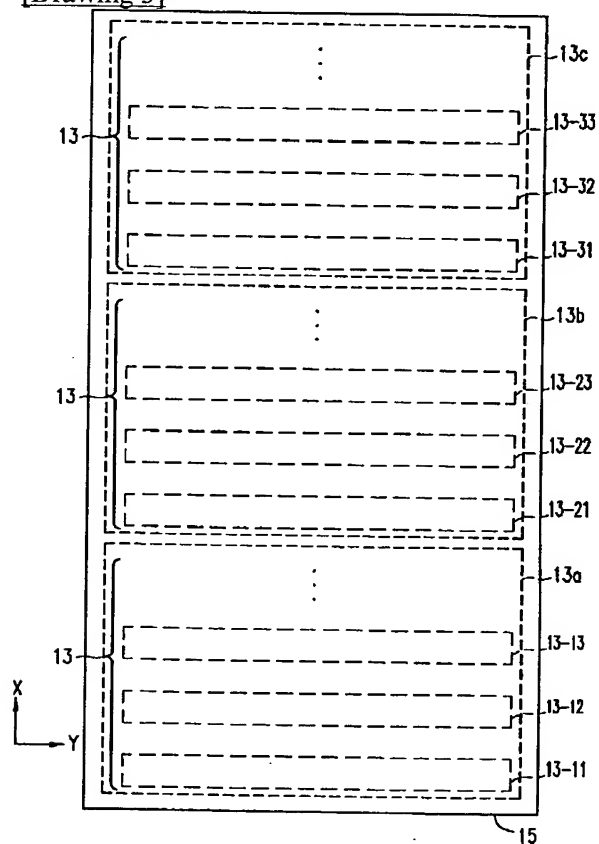




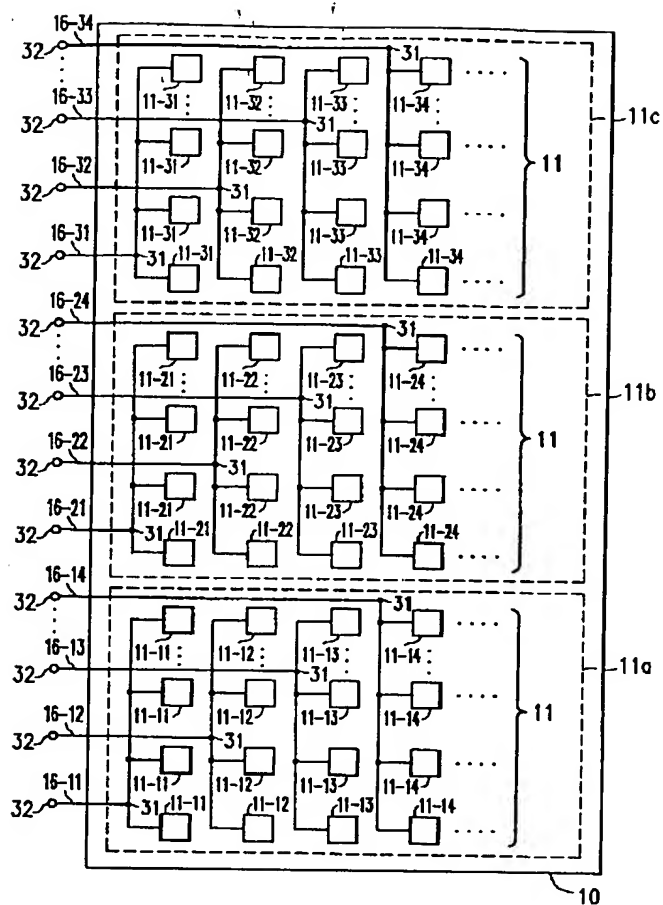
[Drawing 8]



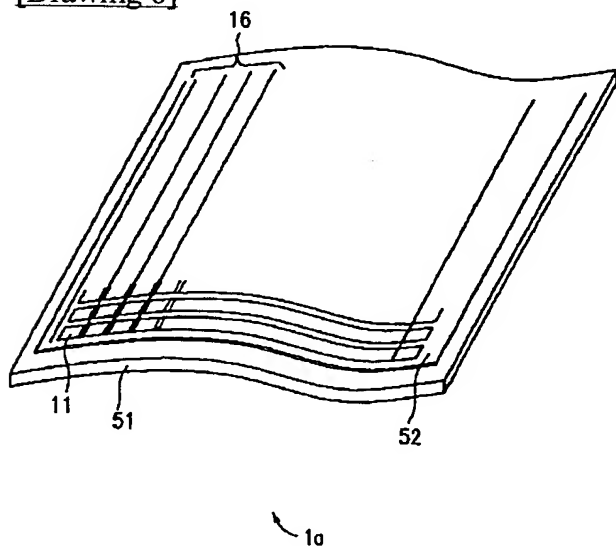
[Drawing 3]



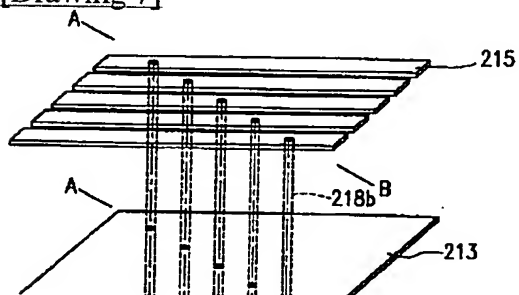
[Drawing 4]

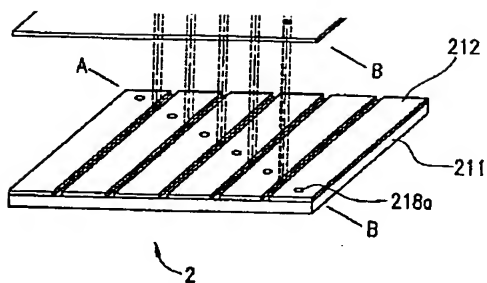


[Drawing 6]

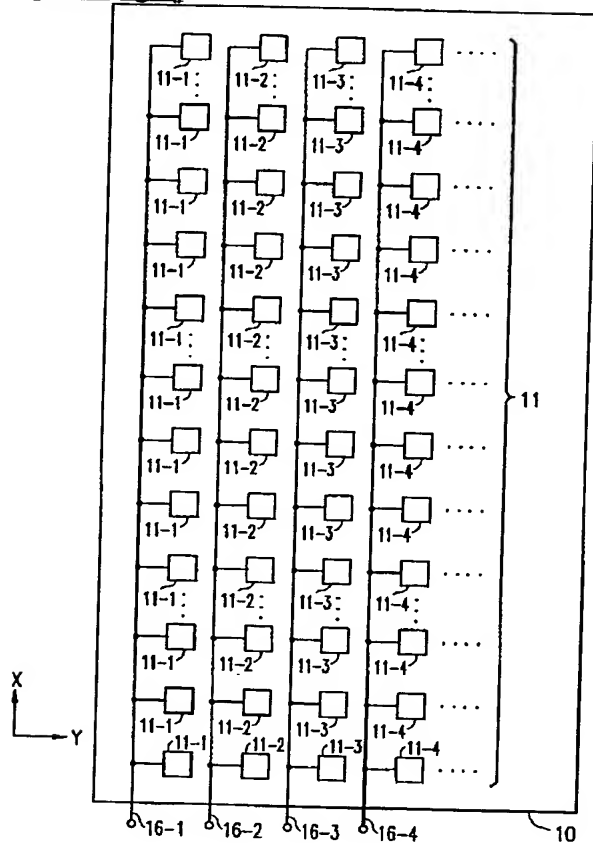


[Drawing 7]

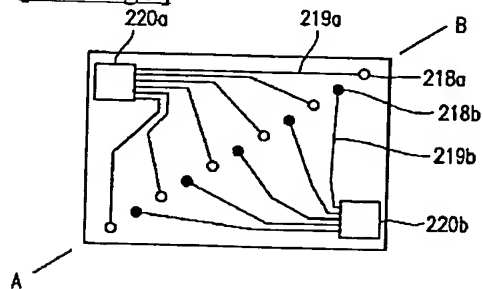




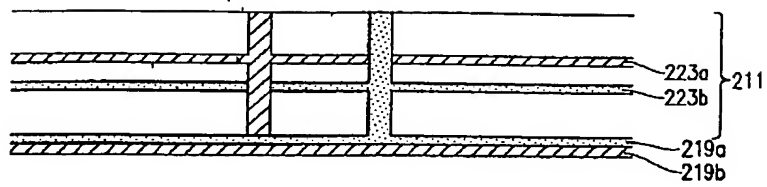
[Drawing 5]



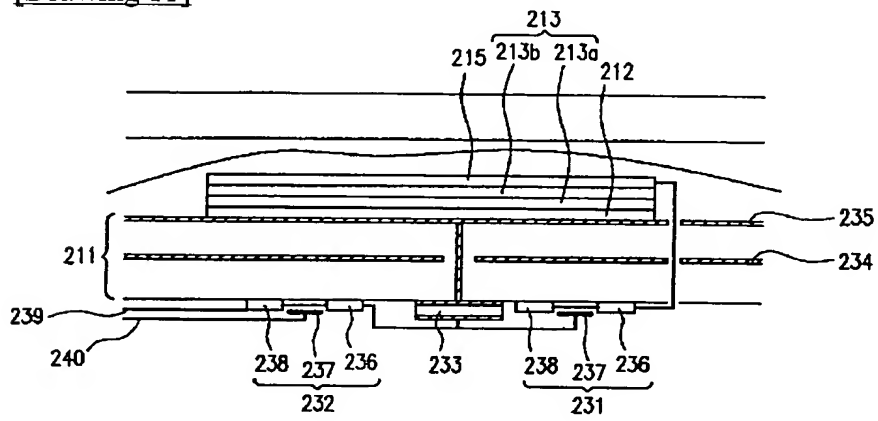
[Drawing 9]



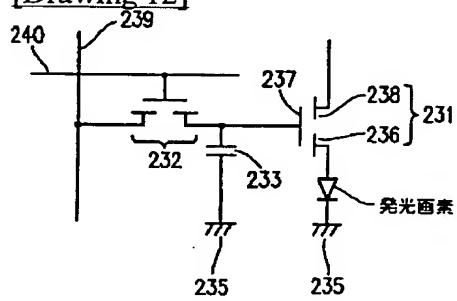
[Drawing 10]



[Drawing 11]



[Drawing 12]



[Translation done.]

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